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CC2000 SERIES

SYSTEM CLOCKS / DISPLAYS

APPLIED TECHNICAL SYSTEMS

CC2000 SERIES SYSTEM CLOCKS / DISPLAYS
REV 09/18/00

DESCRIPTION

CC2000 Series System Clocks provide an economical solution for any size clock system. They are easily corrected by master clock systems with 59th minute and Midnight correction. In addition, all CC2000 Series System Clocks can receive serial data input from computers or other controllers, for setting time and/or displaying short messages such as "FirE" and "bELL". Up to 50 clocks can be connected to a standard RS232 Port at distances of up to 2000 feet away. Signal drivers are available for adding additional clocks and greater distances.

A 12 Volt to 120 Volt, AC or DC pulse for less than 2 seconds on the correction input sets the time to 12:00 (0:00 if 24 hour format). If the pulse is 8 seconds the CC2000 assumes the correction is 59th minute correction, and will set its time to XX:58:02. If the pulse is 12 seconds, the CC2000 will set its time to 5:58:06. For RS232 Correction, a 10 Byte message is required for complete control of the CC2000 including instant 12/24-Hour time correction and ASCII messages such as "FirE" and "bELL". See the section, “RS232 Serial Data Input”, for more details on the 10-Byte message format.

SPECIFICATIONS

Digits:	Four, 4-Inch High, Seven Segment, Super Bright Red LED Digits.
Functions:	12 or 24 Hour Time of Day (jumper selected at the factory).
Accuracy:	Synchronous with the AC power line when power is applied. On power fail backup a 0.005% crystal time base is used. Operating temperature is 0 to 50 Degrees C.
Capacitive Backup:	Self-charging. Keeps time for about one hour of power loss.
Synchronization Input:	Opto-Isolated input. Correction Pulse Voltage Range: 12V - 120V AC/DC (2mA max at 120 VAC). 0 - 6 Second Duration: sets to 12:00 AM (0:00 when 24Hr Format) 7 - 10 Second Duration: sets to XX:58, XX = hour (Displays 12Hr Format Only) 11 - 17 Second Duration: sets to 5:58 (Displays 12Hr Format Only)
RS232 Serial Input	Serial Data, 10 Byte Message. Similar to AE Series 10-byte message format. CC2000’s can be added to most AE Series systems. Sets Time in 12/24Hr format, and/or displays ASCII Messages. 12Hr Format: RS232 overrides and will display 12 or 24 Hr Format. 24Hr Format: Jumper overrides will display 24Hr Format only.
Wiring:	Clearly labeled, pigtail lead wires (#18 AWG) are provided for power and correction signals.
Controls:	Single sided wall mount models have TIME SET switches, which are available at the back panel for manually setting the time. On the flush mount models these switches are located inside the unit and time can be set at the time of installation. All double –sided models must be set from the master clock. See the wiring diagram at the back of this manual.
Power:	Single Sided: 120VAC, 6VA Max, 50/60 Hz (Internal Jumper Selected) 24VAC, 6VA Max, 50/60 Hz (Internal Jumper Selected).

Double Sided: 120VAC, 8VA Max, 50/60 Hz (Internal Jumper Selected)
24VAC, 8VA Max, 50/60 Hz (Internal Jumper Selected).

Enclosures: The **CC2001** and **CC2002** single-sided models have a Black rigid PVC enclosure with a .118" thick red acrylic lens. The back panel is .125" thick black, ABS plastic. A mounting bracket (P/N 1210-0101) is provided for wall mounting to a single or double gang box. Dimensions are 12”W x 6.1”H x 3.5”D.

The **CC2001W2** and **CC2002W2** double-sided wall mount models have a Black rigid PVC enclosure with a .118" thick red acrylic lens on each side. A mounting plate is provided on one end for wall mounting to a single or double gang box. Dimensions are 12”W x 6.1”H x 3.5”D (end mounting plate is 4.6”W x 7.6”H).

The **CC2001C2** and **CC2002C2** double-sided ceiling mount models have a Black rigid PVC enclosure with a .118" thick red acrylic lens on each side. A mounting plate is provided on top, via three-inch fittings for mounting to a single or double gang box. Dimensions are 12”W x 6.1”H x 3.5”D (top mounting plate is 6” x 6”).

The **CC2001F** and **CC2002F** single-sided flush mount models have a white painted steel enclosure with .118" thick red acrylic lens. The back box is included (12.4”W x 7.4”H x 3.6”D). The clock assembly has a white painted bezel (13.4”W x 8.4”H) and mounts to the back box with the screws provided.

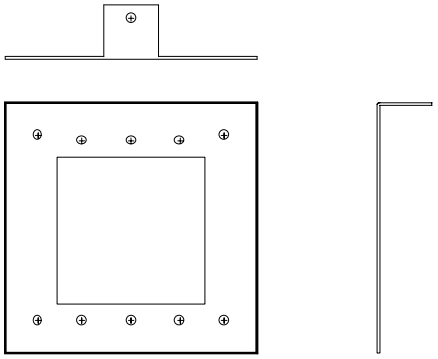
See the drawings at the back of this manual.

INSTALLATION

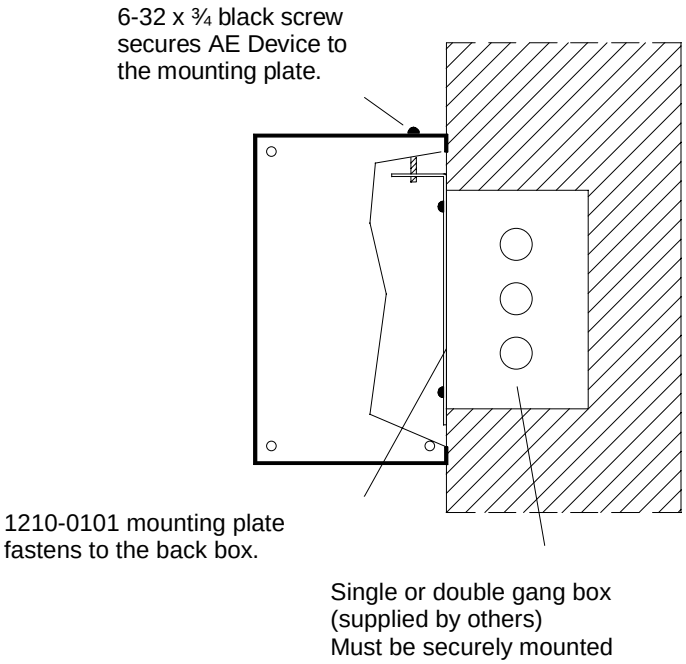
Before installing the CC2000 Series System Clocks, choose the desired correction scheme that best fits your application. For example, if you are adding these clocks to an existing system, be sure your master clock, and/or existing wiring is compatible with one of three different correction schemes provided by the CC2000. If this is a new installation, using an ATS master clock, it will probably be configured for the RS232 Serial Data correction. See the application notes at the back of this manual for the typical clock system configurations for the CC2000 Series.

MOUNTING (WALL MOUNT VERSIONS)

The wall mount versions of the CC2000 Series can be mounted in a variety of ways. Things to consider for mounting include ambient light, viewing area, ambient temperature, dirt or dust. These models are supplied with a wall mount bracket (P/N 1210-0101) for mounting to a single or double gang box. See the detail below.



1210-0101
mounting plate detail



MOUNTING (DOUBLE SIDED WALL OR CEILING MOUNT VERSIONS)

For double-sided, ceiling or wall-mounted models, refer to the specific drawings on the back of the manual.

WIRING

All versions of the CC2000 Series System Clocks have clearly labeled pigtail leads wires for power and signal. On the single-sided versions these leads are provided from the back panel of the unit. On the double-sided versions they are available from the mounting plate. Connect the power and signal wires as required by your system. Also, see the application notes at the back of this manual for the typical clock system configurations for the CC2000 Series.

NOTE: ALL UNITS ARE TO BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND LOCAL ELECTRICAL CODES.

OPERATION

Since the CC2000 Series System Clocks are intended for clock system applications, their times will be set from a master clock or other controlling device such as a computer. Single-Sided models do have TIME SET switches, which are accessible through the back panel, however they will have to be set when the clock is mounted.

Before applying power, be sure all wiring is completed. Apply power to the unit. The clock will display 12:00 and the colons will be flashing. If the backup capacitor is charged, the correct time will be displayed. Time will then be updated by the master clock or controller depending upon the correction scheme used.

MIDNIGHT/NOON CORRECTION

A signal (12 V to 120 V AC/DC) with a duration of 1 to 6 Seconds, applied to the SYNC Input, sets the time to 12:00 AM (0:00 when 24Hr Format jumper is installed).

For 24-Hour time display (requires factory installed jumper), or for time display with the PM indication, apply this signal only at Midnight. The PM indicator will be displayed from 12:00 Noon until 11:59 PM if the unit is set up for 12 Hour Format and the signal is applied only at Midnight.

For 12-Hour time display without the PM indication, apply this signal at Midnight and Noon.

Daylight Savings Time adjustments must be done by the master clock. The adjustment will occur at the CC2000 after the next correction signal is sent by the master clock. For example, with Midnight and Noon correction, the DST adjustment will occur on Sunday at Noon. With Midnight only correction, the DST adjustment will occur on Sunday at Midnight.

59TH MINUTE CORRECTION (12 Hour Format only)

A signal (12 V to 120 V AC/DC) with a duration of 7 to 10 Seconds, applied to the SYNC Input, sets the time to XX:58, where XX is the hours currently being displayed.

A similar signal with a duration of 11 to 17 Seconds applied to the SYNC Input sets the time to 5:58.

The PM indicator will not be displayed in this mode.

Daylight Savings Time adjustments must be done by the master clock. The adjustment will occur at the CC2000 after the next correction signal is sent by the master clock. For example, the DST adjustment will occur on Sunday at 5:58 AM.

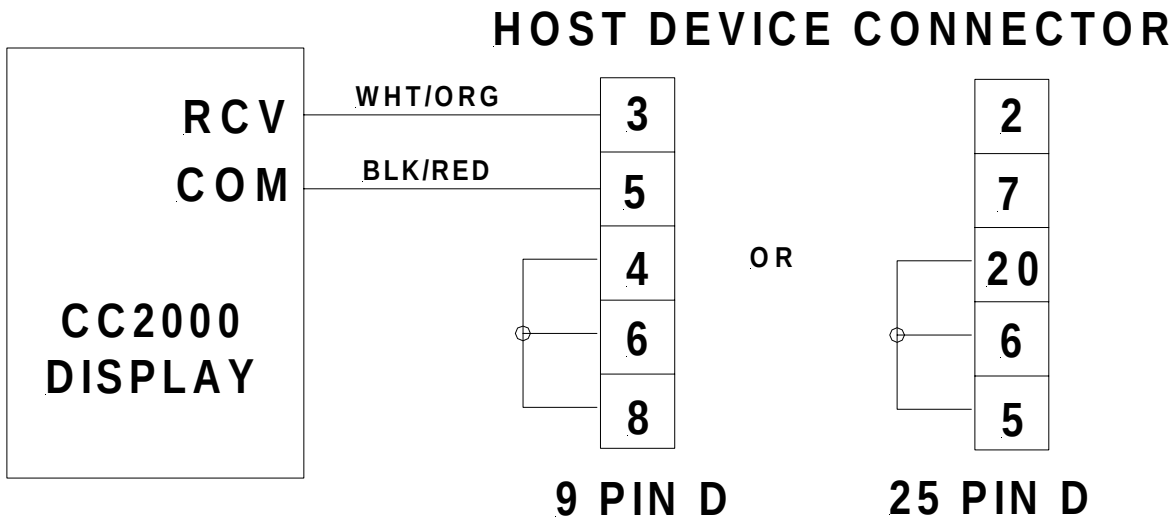
RS232 SERIAL DATA CORRECTION

For RS232 Serial Data Correction a 10 Byte Message is required from a master clock or other control device such as a computer.

Features:	Corrects Time - 12/24Hr, ASCII Messaging
12Hr Format:	RS232 overrides and will display 12 or 24 Hr Format
24Hr Format:	Jumper overrides will display 24Hr Format only

This feature allows CC2000 Series devices to communicate with host computers, process computers (PLC"S), industrial instruments, and other equipment with RS232 output ports, via a 10-byte message. This 10-byte message provides address and mode selection, sends 6 characters of data, and sets display attributes. The host computer or controller can have complete control of all the digits and functions of the CC2000 Series device with simple or complex programs that can output data via an RS232 serial port. Optional Cables: DB9 RS232 data cable (PN: 9110-1115) or DB25 RS232 data cable (PN: 9110-1110)

RS232 WIRING DIAGRAM



2400 BAUD, NO PARITY, 8 DATA BITS, 1 STOP BIT

OPERATION

Before applying power, be sure all wiring is completed. Apply power to the unit.

A 10-byte instruction is required to communicate with the CC2000 Series device. The first byte, byte 0, is the preamble. It establishes communications with the CC2000. The second byte, byte 1, is the address byte that is used for addressing purposes. Only addresses 15 and 0 will control the CC2000. Time set data is usually sent on address 15, such as from the MC Series Master Clock. Other ASCII data such as “FirE” and “bELL” messages are usually sent using address 0. Byte 2 is the mode byte. Several modes are possible providing complete control of all the 7 segment characters and functions of the CC2000 Series products. Bytes 3 through 8 are associated with the six, 7-segment data characters required (CC2000’s display the first four of these six characters). Byte 9 is the miscellaneous digit, which provides attributes such as colons, AM/PM indicators, flash, etc.

BYTE 0: START CHARACTER - An 11H is required to establish communications.

BYTE 1: ADDRESS BYTE - Range is from 0 to 15. CC2000's respond to addresses 15 and 0, only.

BYTE 2: MODE BYTE - Range is from 0 to 255. This byte provides complete control of all AE Series devices with the RS232 option installed. The modes are:

MODE 0 - ASCII character mode. The CC2000 will display the ASCII characters sent in bytes 3 through 8. See the AE ASCII character set at the back of this manual.

MODE 3 - 12 Hour Time/timer mode. Bytes 3 through 8 are set as the time, and time keeping begins.

MODE 4 - 24 Hour Time/timer mode. Bytes 3 through 8 are set as the time, and time keeping begins.

MODE 6 - Displays the software version installed in the AE device.

MODES 8 - 255 are for future use.

BYTES 3 - 8: SIX CHARACTER BYTES – CC2000's have 4 digits, but can be integrated with other systems that include AE Series displays which have 6 digits. The six characters received are for displaying on these six digits. The CC2000's will display the first 4 characters, only. These characters will depend on the mode byte, byte 2, that precedes them. They provide the words for messages, the digits for setting time and variable, and even 7-segment graphic characters.

BYTE 9: MISCELLANEOUS DIGIT BYTE - This byte provides colons, AM/PM indicators, and other attributes such as display flashing.

BIT 0 - Turns on the AM/PM indicator.

BIT 1 - Turns on the colons. Colons are automatically turned on in the time/timer mode, i.e. byte 2 = 3.

BIT 7 - Flash display.

SET TIME (SAMPLE PROGRAM)

```
5 REM 232TIME.BAS SETS TIME IN A CC2000 OR AN AE DEVICE WITH RS232 INPUT
6 REM WRITTEN BY JIM RECCELLI, APPLIED TECHNICAL SYSTEMS, 1/22/94
10 OPEN "COM1:2400,N,8,1" AS 1
20 H1$=MID$(TIME$,1,1)
30 H2$=MID$(TIME$,2,1)
40 H1H2$=MID$(TIME$,1,2)
45 PRINT H1H2$
46 IF VAL(H1H2$)=22 THEN H1$="1":H2$="0":GOTO 60
47 IF VAL(H1H2$)=23 THEN H1$="1":H2$="1":GOTO 60
50 IF VAL(H1H2$)>12 THEN H1H2=VAL(H1H2$)-12:
H1H2$=STR$(H1H2):H1$=MID$(H1H2$,1,1):H2$=MID$(H1H2$,2,1):PRINT H1H2$,H1H2
60 PRINT TIME$
70 M1$=MID$(TIME$,4,1)
80 M2$=MID$(TIME$,5,1)
90 S1$=MID$(TIME$,7,1)
100 S2$=MID$(TIME$,8,1)
120 PRINT#1, CHR$(0);CHR$(0);CHR$(17);CHR$(0);CHR$(3);H1$;H2$;M1$;M2$;S1$;S2$;CHR$(0)
130 CLOSE 1
140 END
```

TECHNICAL SUPPORT

For any questions concerning installation and operation of this product, contact our factory at:

PHONE (800) 444-7161
OR
FAX (318) 797-4864

SERVICE POLICY

It is recommended that all service for this product be done by the factory or by a factory authorized service representative. Applied Technical Systems will provide ongoing service support in and out of warranty. Send your repairs to:

APPLIED TECHNICAL SYSTEMS
849 KING PLACE
SHREVEPORT, LA 71115

APPLIED TECHNICAL SYSTEMS
WARRANTY POLICY

ATS warrants its products to be free of defects in material and workmanship for a period of 24 months from the date of purchase. ATS will repair or replace any product returned to its authorized factory service center within the warranty period so long as there is no evidence that the product has been abused, misused, damaged by lightning, overloads of any kind or water, or altered in any way.

Products returned for warranty must be returned with freight prepaid. ATS will pay normal freight charges to return the product to the customer. Special premium freight requested by the customer will be charged to the customer.

ATS disclaims any warranties expressed or implied, including merchantability and/or fitness for a particular purpose. In no event shall ATS be held liable for incidental or consequential damages.